

Eradication of feral cats on Faure Island, Western Australia

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Abstract

The Australian Wildlife Conservancy, lease holders of Faure Island Pastoral Lease, is planning to establish the area as a site for the conservation of threatened mammals and ecotourism. The AWC propose to translocate a suite of native mammal species to the island. To enable the successful recolonization of the island by these species it was necessary to implement a feral cat eradication program.

Feral cat eradication took place in autumn 2001 and comprised two stages – an aerial baiting campaign and a follow up ground baiting, trapping and monitoring program. The baiting campaigns utilized the recently developed feral cat bait (*Eradicat*[®]) and the toxin sodium monofluoroacetate (1080). Baits were deployed, followed by an intensive 20-day monitoring program. Results from the monitoring program indicated that eradication had been successfully achieved and was accomplished from the baiting application alone. Searches for evidence of cat activity in winter 2001 by an independent team confirmed these results.

Keywords: cat eradication, islands, cat bait, cat trapping, Faure Island.

Introduction

The Australian Wildlife Conservancy (AWC), lease holders of Faure Island Pastoral Lease, plans to establish the area as a site for the conservation of threatened mammals. No native mammals now occur on the island; however there is evidence from sub-fossil deposits that at least four species once occurred on the island. The AWC propose to translocate four native mammal species to the island: the Western Barred Bandicoot (*Perameles bougainville*); Boodie (*Bettongia lesueur*); Shark Bay Mouse (*Pseudomys fieldi*) and Banded Hare Wallaby (*Lagostrophus fasciatus*). To enable the successful recolonization of the island by these species it was necessary to implement a feral cat (*Felis catus*) eradication program. Feral cats became established on Faure Island during the late 19th century and were probably introduced from pearling vessels or by early pastoralists.

The importance of islands to the conservation of Australian mammal species has been well documented (Burbidge & McKenzie 1989; Abbott & Burbidge 1995). One of the key factors in the historic importance of islands has been that most have remained free of introduced predators. Burbidge (1999, pp 72) highlighted the current and future importance of islands to nature conservation and stated that “Australian nature conservation agencies need to pay more attention to the eradication of exotic animals from islands”.

Feral cats pose a serious threat to populations of small to medium-sized native vertebrates (Environment

Australia 1999; Department of the Environment, Water, Heritage & the Arts 2008). Anecdotal evidence has indicated that predation by feral cats, either acting singly or in concert with other factors, has resulted in the local extinction of a number of species on islands and mainland Australia. Predation by feral cats also affects the continued survival of many native species persisting at low population levels (Dickman 1996; Smith & Quin 1996; Risbey *et al.* 2000) and has prevented the successful re-introduction of species to parts of their former range (Christensen & Burrows 1995; Gibson *et al.* 1995; Priddel & Wheeler 2004). Control of feral cats is recognized as an important conservation issue in Australia today and as a result, a national ‘Threat Abatement Plan for Predation by Feral Cats’ was developed (Environment Australia 1999; Department of the Environment, Water, Heritage & the Arts 2008). Management of introduced predators is now generally viewed as a critical component of successful reintroduction, recovery or maintenance of small to medium-sized native fauna populations (Christensen & Burrows 1995; Fischer & Lindenmayer 2000).

The Western Australian Department of Environment and Conservation (DEC), through Project ‘Western Shield’, has been conducting research to develop an effective, broad-scale feral cat control strategy. As a result of our research, a request was made to DEC to conduct a feral cat eradication program on Faure Island. A preliminary study to assess the feasibility of feral cat eradication on the island was conducted in September 2000 (Algar & Angus 2008). During this preliminary study a small-scale trapping program, bait acceptance trial and intensive searches for evidence of cat activity were conducted. Trapping in conjunction with

assessment of track activity provides a simple and effective method to assess approximate cat density and distribution (Algar *et al.* 1999). These surveys of feral cat activity indicated there was a population of approximately 40 adult cats on the island at that time (Algar & Angus 2008).

Cats readily consumed non-toxic baits during this preliminary study. On-track bait acceptance trials, using baits placed at 100 m intervals on tracks, indicated that 67 % of the sampled population consumed at least one bait (Algar & Angus 2008). Analysis of cat stomach contents indicated that the principal dietary items being consumed at this time were reptiles, in particular hatchling Gould's Monitors (*Varanus gouldii*). Activity of *Varanus* spp. and their relative size would have provided a reasonable prey source for cats. Bait acceptance by feral cats is, in part, related to the abundance of prey species. Bait consumption generally increases as prey availability declines (Algar *et al.* 2007). On Faure Island, the increased size of young varanids, through summer and into autumn, was likely to reduce their vulnerability to predation. Bait consumption by cats was therefore expected to increase from that recorded in September, given the reduction of this prey resource.

A feral cat eradication campaign was conducted on Faure Island during early autumn 2001, a season when bait acceptance was predicted to be high and the campaign was unlikely to be affected by rainfall. An aerial baiting campaign was adopted as the primary control technique. Following the baiting campaign a ground-baiting, trapping and monitoring program was employed to remove any cats that remained. This control strategy was successfully employed on the Montebello Islands (Algar & Burbidge 2000; Algar *et al.* 2002) and was adopted as a suitable approach on Faure Island. This paper describes the feral cat eradication campaign on Faure Island.

Methods

Site Description

Faure Island is located between 25°48'S and 25°54'S and between 113°51'E and 113°56'E (see Figure 1). The island, an area of 58 km², lies within the eastern gulf of Shark Bay at the head of the Hamelin Pool embayment, approximately 18 km east of Monkey Mia. Shark Bay has a semi-arid to arid climate with hot dry summers and mild winters (Wilson 2008). Summer minimum and maximum temperatures average between 20 °C and 35 °C respectively and winter temperatures between 10 °C and 20 °C. Faure Island Pastoral Lease records (1991–2005) show that rainfall falls predominately between March and August with an average of 185 mm per annum (AWC, unpublished data). Most rain falls in the winter months but cyclones bring summer rain some years. There are five major vegetation types on the island: *Acacia* shrublands on an undulating red sandplain which covers the majority of the island; Mallee Eucalypt shrubland; *Spinifex* grassland backing onto the beaches and on the coastal dunes; samphire and *Atriplex* shrubland in and surrounding birridas and saline flats and mangrove communities interspersed with succulent shrublands (Keighery & Muir 2008).

Baits and Baiting Program

DEC researchers at the time of this baiting campaign had recently completed development of a bait to control feral cats. The bait (*Eradicat*®) is similar to a chipolata sausage, approximately 20 g wet-weight, dried to 15 g, blanched and then frozen. The bait is composed of 70 % kangaroo meat mince, 20 % chicken fat and 10 % digest and flavour enhancers that are highly attractive to feral cats (Patent No. AU 781829). The toxic baits were manufactured at the DEC Bait Factory at Harvey and airfreighted to the island. The toxin 1080 (sodium monofluoroacetate) was injected into the baits at a dose of 4.5 mg per bait. Prior to application, the baits were thawed and placed on racks, in direct sunlight. This process allows the oils and digest material to come to the surface of the bait. At this time, all baits were sprayed with an ant deterrent compound (Coopex®) at a concentration of 12.5 gl⁻¹ as per the manufacturer's instructions. Ant attack on baits rapidly degrades the bait medium, reducing palatability and the persistence of ants on the bait deters uptake by feral cats (D Algar, pers. obs.). Baits were counted into bags (100 baits per bag) on-site to contain the required number of baits per 1 km² baiting cell. Although prior to the adoption of a 'Code of Practice on the Use and Management of 1080' (Health Department, Western Australia) and associated '1080 Baiting Risk Assessments', considerable review and consideration of the hazard the intended baiting could have on known non-target species' populations on the island was undertaken. This analysis concluded that there was unlikely to be any significant effects on non-target species' populations such as Gould's Monitors on the island.

The optimum baiting intensity for feral cats is not currently known and is likely to vary with location, habitat, cat density and time. In an attempt to maximize the availability of baits, a baiting intensity of 100 baits km⁻² was used. This baiting intensity was aimed at maximizing the likelihood of cats encountering a bait when hungry. The baits were deployed from a Beechcraft Baron E55 aircraft, flying at a nominal speed of 160 kt and 1000 ft (Above Ground Level). The aircraft was guided by an AG-NAV navigation system with pre-set flight lines for the target area. A timing light indicated to the bombardier when baits must be dropped to achieve the desired bait distribution. A flight plan was prepared that ensured flight cells were one km intervals across the island with an additional flight line following the coast, and another deploying baits in the interdunal swales. Baits were distributed on the 28 February 2001.

A ground baiting program was implemented in areas where evidence of fresh cat track activity was observed. Single baits were placed on marked sand pads, swept clean of tracks, at approximately 20 m intervals along tracks or cross-country. The ground baiting program continued on a daily basis until no further evidence of cat activity was recorded.

Trapping Program

An intensive trapping and cat activity monitoring program across the island commenced 10 days following baiting. The 10-day period allowed cats sufficient time to encounter and consume baits prior to any potential bait degradation. Five personnel were involved in the

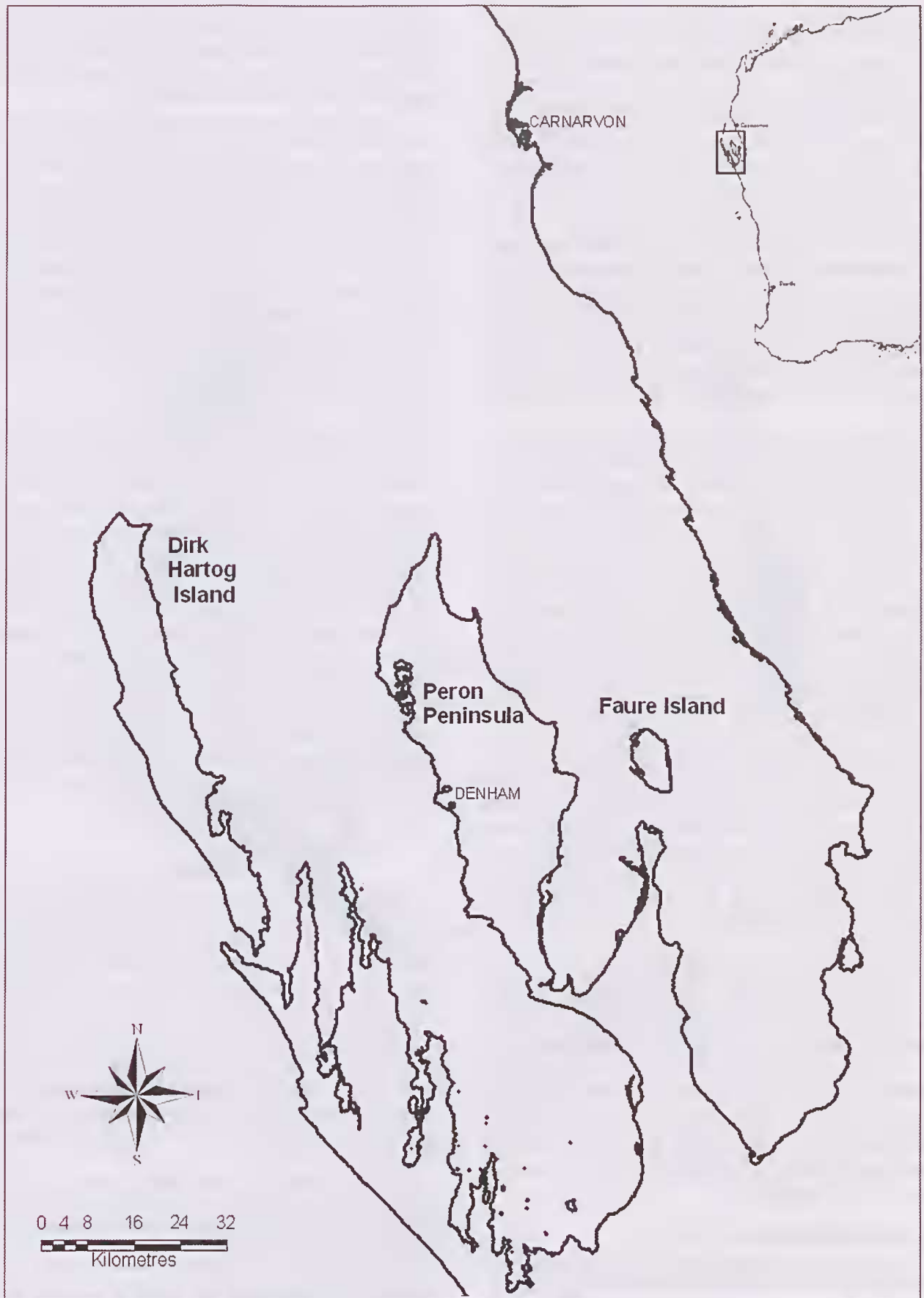


Figure 1. Location of Faure Island.

trapping/monitoring program. The trapping and monitoring exercise was conducted over 20 days in total.

Trapping systems for cats have generally relied on food-based lures as the trap attractant (reviewed by Veitch 1985). A number of other olfactory scents or social odours to entice cats into traps or bait stations have also been used (Veitch 1985; Clapperton *et al.* 1994; Edwards *et al.* 1997). An alternative technique to these systems, using lures that mimic signals employed in communication between cats, has been developed by DEC researchers and proven highly successful. Cats are very inquisitive about other cats in their area; their communication traits are principally reliant on audio and olfactory stimuli. The trapping technique employed padded leg-hold traps, Victor 'Soft Catch'® traps No. 3 (Woodstream Corp., Lititz, Pa.; U.S.A.), a Felid Attracting Phonic (FAP, Patent No. AU 740648, Westcare Industries, Western Australia) that produces a sound of a cat call and a scent lure consisting of a mixture of faeces and urine.

Each trap site consisted of a channel slightly wider than the width of one trap and 80 cm in length, cleared into a bush to create a one-way trap set. Two traps, one in front of the other were positioned at the entrance of the set, at each trap site. A trap bed was made so that when lightly covered with soil, the traps were level with the surrounding ground surface. A guide stick was placed in front of the traps to force animals to lift their foot then push down onto the pressure plate. Both traps were secured in position by a 30 cm length of chain to a 30 cm steel anchor peg. A 12 x 8 x 2 cm foam pad was placed below the pressure plate to prevent soil from falling into the trap bed and compacting under the plate. The traps were then lightly covered with soil.

Cats are lured to the trap set initially by the audio signal produced by the FAP. The FAP is located at the back of the trap set, either concealed under leaf litter or hidden within the bush. The FAP consists of a 36 x 25 mm printed circuit board with a microprocessor data driven voice ROM. As cats approach the trap set they are further enticed into the traps by the scent lure. Approximately 20 ml of this mixture is placed in a shallow depression about 30 cm from the centre of the back trap.

Traps were positioned along all vehicle access tracks and along the coastal/dune areas not readily accessible by motor vehicle. Traps using the FAP/scent lure combination were located at one km intervals and those employing the scent lure alone were positioned at the intervening 500 m intervals. Trap locations were recorded using GPS receivers and are shown in Figure 2. Traps were set in position for a period of at least 11 days before retrieval. In total, 123 trap sets were placed over the island during the trapping period. Ninety four of these were in place for more than 14 days to achieve a total of 1,819 trap nights.

Monitoring Program

The monitoring program consisted of recording the presence or absence of cat track activity along transects, trap locations and sand plots. Four methods were used to monitor for cat activity on the island: observation from the vehicle undertaking the trapping program along

access tracks; cross-country transects conducted both on-foot and by motor cycle; and intensive on-foot searches along the beaches, interdunal swales and mangroves. The location of cat track activity was recorded and the area swept clear following inspection.

There was a 59 km network of vehicle access tracks on Faure Island. These tracks were inspected daily for evidence of cat activity from a 4WD vehicle, driven at a speed less than 10 kmh⁻¹. On-foot searches, undertaken every second day, were conducted from the Fishing Hole to the Point on the east coast, the entire south coast and much of the west coast, providing 22 km of walking transect (see Figure 2). The beach areas north of the Fishing Hole on the eastern and northern coasts were inter-tidal and comprehensively covered by the vehicle transect. Further to the regular inspection of transects; intensive, random searches were conducted routinely every two days of dune and mangrove areas, not otherwise readily accessible (Figure 3).

Motorcycle transects were established such that they bisected each block of inaccessible land, along the longest axis (Figure 2). The end-points of each transect were measured from a geo-referenced map and stored as waypoints in a GPS receiver. Sand plots were placed at nominal intervals of one km, along each transect. Each sand plot contained a FAP attractant, with loud speaker fitted, hidden within the foliage of a shrub. The sand plot was smoothed over the entire circumference of the shrub. The total area of the sand plot varied with the size of the shrub but was at least two metres wide. All transects were traversed prior to sand plot placement and any sign of cat track activity was removed from approximately 10 m either side of the alignment. Following sand plot placement, transects were traversed every second day, for at least nine days, at a speed of less than 10 kmh⁻¹. Evidence of cat track activity was also searched for while traversing the motorcycle transects. A total of 21 sand plots were placed along 28 km of transect.

Results

Evidence of fresh cat activity was observed around the water points, homestead and Landing by the caretaker manager prior to the baiting program on a visit to the island in mid February 2001 (Dick Hoult pers. comm.). Following the aerial baiting program no cats were trapped and no sign of fresh cat activity was observed at any of the trap locations or sand plots over the entire trapping/monitoring period. The only evidence of fresh cat activity was in the area bounded by the Landing, Landing Rd., Buffel Rd. and the coast. Activity was recorded along the 4WD transect on Landing Rd., Buffel Rd. and along both the on-foot and motorcycle transects that traverse this block.

Intensive searches identified a core of activity immediately inland of the coastal dunes and indicated that two to three cats had survived the aerial baiting program. This activity was recorded on the first day of monitoring and a localized ground baiting was conducted in the area, that day and the following. Subsequent assessment of cat tracks and activity in the ground-baited area over the next two days indicated that at least five baits were positively taken by cats. Transects



Figure 2. Locations of trap sets, monitoring plots, and transects.

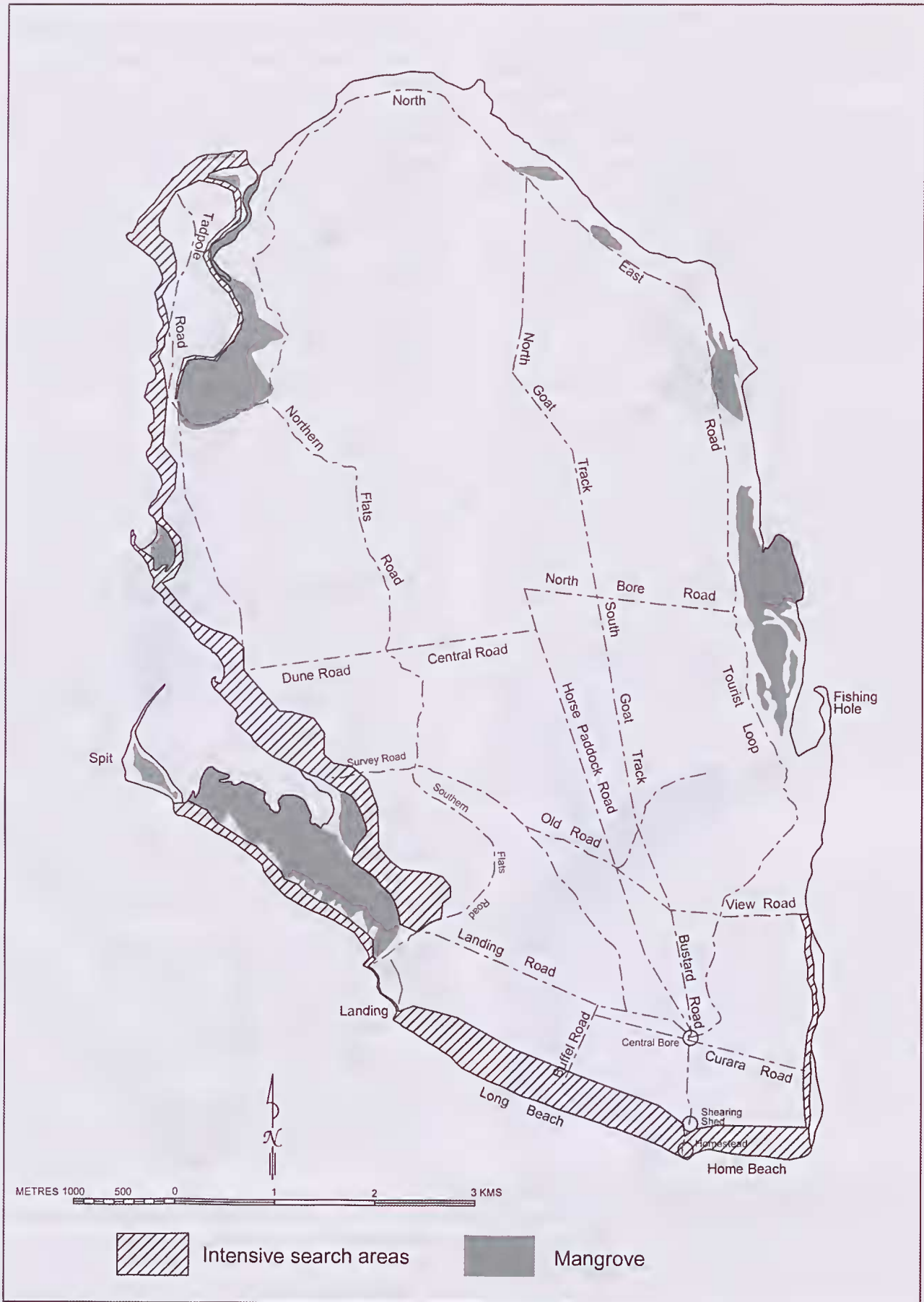


Figure 3. Location of intensive, random searches conducted in dune and mangrove areas.

and sand plots in the area were inspected every second day; however no further fresh cat activity was found over the following 16-day monitoring period. Intensive searches in this area failed to locate any baits. Elsewhere on the island, baits were regularly found during searches, and it is believed that no baits were aerially distributed over the area.

The aerial baiting campaign was responsible for the removal of at least 90 % of the cats on the island, given that a population of approximately 40 adult cats was present on the island the previous spring and that only two to three cats survived the aerial baiting program. This figure may have been higher as natal recruitment into the population would have occurred over the late spring and summer.

An intensive survey for evidence of cat activity conducted in June 2001 by an independent team confirmed that eradication of cats on the island had been successful (Thomas & Whisson 2001).

Discussion

Cat eradication programs on islands are usually conducted using a combination of baiting, trapping and hunting (Rauzon 1985; Veitch 1985; Bloomer & Bester 1992; Bester *et al.* 2000; Rauzon *et al.* 2008). These eradication programs have met with varied success, their success and time to completion having been limited in part by lack of an effective bait and trap lures.

It appears that eradication was achieved at Faure Island and the failure to locate any cat activity with such an intensive monitoring program strongly supports this. However, only time and subsequent inspections will provide absolute confirmation. Genetic material gathered during the initial feasibility study will indicate whether any cat found on the island in the future is a remnant of the original population or a subsequent introduction.

This aerial baiting program was conducted prior to equipment being available to download maps of bait distribution from the aircraft. Had a bait distribution map been available, any area where baits had not been deployed could have been flown again. The fact that the remaining cat/s readily took baits, complete coverage of the island with the prescribed baiting density may have resulted in total eradication from the aerial baiting program alone. Nowadays, mapping of bait distribution is undertaken and these are provided following all baiting programs. Monitoring cat activity and providing indices of abundance immediately prior to baiting has also been implemented to provide a more accurate measure of the impact of the baiting exercise.

Given the data in Nogales *et al.* (2004), Faure Island may be the third largest island in the world where feral cats have successfully been eradicated. The cat eradication campaign and monitoring program on Faure Island was achieved within a month. Elsewhere in the world, cat eradication projects on islands have often taken months or years, or are still ongoing (Nogales *et al.* 2004). It is difficult to compare the efficacy of the eradication campaign conducted on Faure Island with others, which have taken place on islands of different climate, terrain, shape and size and with different prey

availability. However, the advances in cat control strategies developed by DEC may provide the techniques necessary for effective eradication of feral cats from many islands around the world. Further feral cat eradication programs for a number of other islands off the Western Australian coast are now being planned.

The four threatened native mammal species: the Western Barred Bandicoot; Boodie; Shark Bay Mouse and Banded Hare Wallaby proposed for translocation to Faure Island have since successfully recolonized the island following eradication of cats (Richards 2007).

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